

Application No.: 09/898,338
Amendment Dated: August 4, 2004
Reply to Office Action of: May 4, 2004

MTS-3268US

Remarks/Arguments:

Missing Acknowledgment of Foreign Priority

This application claims priority on Japanese application JP 2000-200,658, filed July 3, 2000. The Examiner is again respectfully requested to acknowledge a claim for foreign priority and that all certified copies of priority documents have been received. These documents were mailed October 29, 2002, with the Response to Missing Parts, but were not acknowledged in either the communication of October 1, 2003, or in the communication of May 4, 2004.

Amendments

No amendments have been made to either the claims, the drawings, the abstract, or the specification.

Rejection under 35 USC 102(e)

Claims 2-5 and 8-16 were rejected under 35 USC 102(e) as anticipated by Futamura, U.S. Pat. No. 6,162,894 ("Futamura"), "for reasons of record." This rejection is respectfully traversed.

In the previous response, applicants' pointed out that Futamura discloses a method in which flame-retardant resin material is heated to 300°C to 420°C to yield oily substances, which may be used as fuels. Futamura, Abstract. Futamura further discloses that "The oil-yielding treatment of the present invention permits a resin material to be decomposed to gaseous products and oils." Futamura, column 4, lines 6-10 (emphasis added).

In applicants' method, the claims recite that the reaction is carried out at a temperature lower than a thermal decomposition temperature of the resin composition. As an example of this, it was pointed out that pages 46 and 47 of the specification disclose that polystyrene is thermally decomposed at 300°C. Thus, Futamura's process, resins are heated above their decomposition temperatures.

In response, the Office asserts that Futamura discloses "other resins materials, which do not include styrene, such as tetrabromobisphenol A (see col 22, lines 23-43)." Office action, page 5, lines 11-13. It is respectfully pointed out that tetrabromobisphenol A is not a resin material. It is a flame retardant. See, for example, Great Lakes Chemical Corporation MSDS for BA-59P and BA-59PC, available

Application No.: 09/898,338
Amendment Dated: August 4, 2004
Reply to Office Action of: May 4, 2004

MTS-3268US

from the Internet at "greatlakes.com", a copy of which is enclosed. Further, the passage relied on by the Office, Futamura, column 22, lines 23-43, shows decomposition of tetrabromobisphenol A to other aromatic compounds.

Absence from the reference of any claimed limitation negates anticipation. As discussed above, Futamura expressly discloses that the resin is decomposed in his process. Applicants' claims recite that the reaction is carried out at a temperature lower than a thermal decomposition temperature of the resin composition. Consequently, heating below the decomposition temperature is not disclosed by Futamura. Therefore, the rejection of claims 2-5 and 8-16 as anticipated by Futamura should be withdrawn.

Claim 16

In the previous Office action, the Office asserted that "the treatment of chips of personal computers would provide the limitation to separate the metal from the resin, since the treatment would dissolve the resin (see col. 2, lines 50-55)." Office action of 10/10/2003, page 2, line 24, to page 3, line 2. This assertion is respectfully traversed. There is no disclosure in the cited passage that the "chips of personal computers" contain metals. Read in context, the passage is referring to the casing materials of personal computers, not to their electronic components. Note that column 1, line 20, specifically refers to the "bodies of personal computers."

Contrary to the Office assertion, Futamura does not show separation the resin from metals. Absence from the reference of any claimed limitation negates anticipation. For this additional reason, the rejection of claim 16 as anticipated by Futamura should be withdrawn.

Rejection under 35 USC 102(a)

Claims 2-6, 8-16, and 20-24 were rejected under 35 USC 102(a) as anticipated by Ueno, EP 1008395 A2 ("Ueno"). This rejection is respectfully traversed.

Ueno's process is directed to the treatment of waste printed circuit boards. Printed circuit boards contain, among other things, solder, copper, and various electronic components. The resin is typically an epoxy resin, a phenolic resin, a polyester, or a polyimide. Ueno, paragraph [0033]. In Ueno's process:

- 1) Waste printed circuit boards containing copper foil and solder are dry

distilled at a temperature of 250°C or higher. At this temperature the resin becomes brittle and the copper dissolves into the solder. Claim 1; paragraphs [0034] and [0056].

2) The resulting material is pulverized. Because the brittle resin is more easily pulverized than the solder, the resulting resin particles are smaller than the solder particles. Paragraphs [0030-32].

3) The resulting particles are separated by size, thus effecting a separation of the resin components from the solder particles. Paragraph [0032].

In addition, the waste printed circuit boards may be initially immersed in a solvent prior to dry distillation, which causes the resin to become brittle. Paragraph [0071].

Claims 2-6, 8-16, and 20-24

The Office has equated Ueno's initial immersion step with the process recited in the broad claims. In the claimed process, a halogen-containing flame-retardant resin composition is brought into contact with mixture containing (1) a dehalogenation promoting material, and (2) a dehalogenation material under conditions recited in the claims.

The Office asserts, without support, that "The metals contained in the printed circuit board would react upon the dehalogenation material." Office action, page 2, lines 12-13. This assertion is respectfully traversed.

The instant specification discloses, among other materials, lithium, calcium, magnesium, zinc, iron, and titanium as dehalogenation materials. Specification, page 40, lines 8-9; and original claim 8. However, the Office has provided no evidence that any of the metals Ueno discloses as contained in the printed circuit board can act as dehalogenation materials under the conditions disclosed by Ueno. If this rejection is maintained, the Office is respectfully requested to point out which metal or metals disclosed by Ueno can act as dehalogenation materials and to place evidence on the record that they can act as dehalogenation materials under the conditions disclosed by Ueno. See, *In re Lee*, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002) (agency must make record).

The Office has not made a record to support this rejection. There is no

Application No.: 09/898,338
Amendment Dated: August 4, 2004
Reply to Office Action of: May 4, 2004

MTS-3268US

evidence to indicate that any of the metals disclosed by Ueno can act as dehalogenation materials under the conditions disclosed Ueno. Therefore, the rejection of claims 2-6, 8-16, and 20-24 as anticipated by Ueno should be withdrawn.

Claims 8, 22, and 23

Claims 8, 22, and 23 each recite a list of specific dehalogenation materials. The Office has not pointed out which material or materials recited in these claims is disclosed by Ueno. If this rejection is maintained, the Office is respectfully requested to point out which of the materials recited by these claims is disclosed by Ueno and where in Ueno such disclosure appears. See, 37 CFR 1.104(c)(2).

The Office has not made a record to support the rejection. The Office has not pointed out which material or materials recited in the claims is disclosed by Ueno. Absence from the reference of any claimed limitation negates anticipation. For this additional reason, the rejection of claims 8, 22, and 23 as anticipated by Ueno should be withdrawn.

Claims 6

The Office asserts that "contact of the pelleted resin with the ethylene glycol would read upon the kneading of the mixture while applying shear force of claim 6 (see page 15, example 5.)." Office action, page 2, lines 14-16. This assertion is respectfully traversed.

In Example 5, the printed circuit board was immersed in ethylene glycol at 170°C for 2 hours. There is no disclosure of "kneading of the mixture while applying shear force" during the immersion process. The Office has provided no evidence that immersion in a solvent is equivalent to kneading of the mixture while applying shear force. If this rejection is maintained, the Office is respectfully requested to provide such evidence. See, *In re Lee*, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002) (agency must make record).

The Office has not made a record to support the rejection. Absence from the reference of any claimed limitation negates anticipation. Ueno does not disclose kneading of the mixture while applying shear force. For this reason, the rejection of claim 6 as anticipated by Ueno should be withdrawn.

Application No.: 09/898,338
Amendment Dated: August 4, 2004
Reply to Office Action of: May 4, 2004

MTS-3268US

Claims 10 and 11

Claim 10, on which claim 11 depends, recites elimination of oxygen prior to contact of the halogen-containing flame retardant-containing composition with the material mixture containing the dehalogenation material and the dehalogenation promoting material.

The Office asserts that "The Ueno reference discloses the removal of oxygen before treatment (see page 12, lines 45-50)." Office action, page 2, lines 17-19. This assertion is respectfully traversed.

Paragraph [0078] of Ueno, the passage relied upon, discloses exclusion of oxygen during the dry distillation step, not during the initial immersion step. Ueno's dry distillation step takes place after the initial immersion step, so oxygen is excluded after immersion, not before contact of the halogen-containing flame retardant-containing composition with the material mixture containing the dehalogenation material and the dehalogenation promoting material, as recited by the claim 10.

Absence from the reference of any claimed limitation negates anticipation. For this reason, the rejection of claim 10 and claim 11, dependent thereon, as anticipated by Ueno should be withdrawn.

Claim 16

The Office asserts that "the treatment of chips of personal computers would provide the limitation to separate the metal from the resin, since the treatment would dissolve the resin (see page 12, lines 1-11)." Office action, page 2, line 20, to page 3, line 3. This assertion is respectfully traversed.

This cited passage discloses that "By this immersion treatment a part of the board resin component is preliminary decomposed or swelled up, and hence, the board resin component becomes preferably and sufficiently brittle at a lower temperature and in a shorter time in the heating process." Contrary to the Office assertion, the resin is not dissolved. It is swelled.

As discussed above, Ueno's overall process separates metal from the resin. If the resin and the metal were separated during the initial immersion, the additional steps of Ueno's process would be unnecessary. If the resin were removed during the initial immersion, Ueno would be unable to pulverize the brittle resin after the dry

Application No.: 09/898,338
Amendment Dated: August 4, 2004
Reply to Office Action of: May 4, 2004

MTS-3268US

distillation because there would be no resin to pulverize.

Ueno's initial immersion does not separate metal from resin as alleged by the Office. Absence from the reference of any claimed limitation negates anticipation. For this reason, the rejection of claim 16 as anticipated by Ueno should be withdrawn.

First Rejection under 35 USC 103(a)

Claims 6 and 25 were rejected under 35 USC 103(a) as unpatentable over Futamura "applied as record." Claim 6, on which claim 25 depends, recites a process in which the resin is brought in contact with a dehalogenation material and a dehalogenation promoting material at a temperature lower than the thermal decomposition temperature by kneading the mixture while applying shear force, wherein the contact by kneading while applying shear force is carried out by a biaxial kneading extruder, a kneader, or rotation rolls.

In the previous Office action, the Office assert that "grinding of the pelleted resin would read upon the kneading of the mixture while applying shear force of claim 6." In response, applicants' pointed out that Futamura, the resin is ground and then heated. Grinding and heating do not occur at the same time. It is further noted, that in applicants' process, grinding and heating are carried out in the presence of a material mixture containing a dehalogenation material and a dehalogenation promoting material. By carrying out the grinding and heating in this manner, contact of the halogen-containing flame-retardant resin composition with the material mixture containing a dehalogenation material and a dehalogenation promoting material is promoted. Specification, page 24, lines 1-5. This leads to a "remarkable increase of the efficiency of the dehalogenation treatment." *Id*, lines 6-16.

The Office asserts that it would be obvious to combine the heating and grinding steps. In support, the Office asserts, without citation of authority, that "such combination of steps into one step has been well settled to be within the skill of the ordinary artisan, unless such combination produces unexpected results." If this rejection is maintained, the Office is respectfully requested to place on the record the authority on which it relies for this assertion. *See, In re Lee*, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002) (agency must make record).

Further, as noted above, heating and grinding in the in the presence of a material mixture containing a dehalogenation material and a dehalogenation leads to a

Application No.: 09/898,338
Amendment Dated: August 4, 2004
Reply to Office Action of: May 4, 2004

MTS-3268US

"remarkable increase of the efficiency of the dehalogenation treatment." This result is unexpected. Thus, the rejection of claims 6 and 25 as unpatentable over Futamura should be withdrawn.

Further, as discussed above, Futamura heats the resin material above its decomposition temperature. The Office has shown no motivation for the person of ordinary skill in the art to modify Futamura to heat the resin below its decomposition temperature. For this additional reason, the rejection of claims 6 and 25 as unpatentable over Futamura should be withdrawn.

Second Rejection under 35 USC 103(a)

Claims 17-19 and 25 were rejected as being unpatentable over Ueno. This rejection is respectively traversed.

Claim 17

Claim 17 recites a process in which the resin composition comprises styrene and the styrene is recovered. The Office admits that Ueno does not disclose the recovery of styrene. However, the Office asserts that the recovery of such material would be obvious because such recovery would be economically beneficial.

Ueno discloses nothing about styrene. The resin materials disclosed by Ueno are epoxy resins, phenol resins, polyester, and polyimide. Paragraphs [0033] and [0049].

As discussed above, Ueno does not disclose a process in which a resin material is brought into contact with mixture containing (1) a dehalogenation promoting material, and (2) a dehalogenation material under conditions recited in the claims. Further, Ueno discloses nothing about styrene. The Office has given no motivation why the person of ordinary skill in the art would be motivated to modify the process of Ueno to produce the process recited in applicants' claim 17 by including this step. Therefore, the rejection of claim 17 as unpatentable over Ueno should be withdrawn.

Claims 18 and 19

Claims 18 and 19 recite processes in which the bromine is recovered. The Office admits that Ueno does not disclose the recovery of bromine. See, however, Ueno, paragraph [0078], which discloses removal, but not the recovery, of halogen at a temperature of 350°C or higher. However, the Office asserts that the recovery of

Application No.: 09/898,338
Amendment Dated: August 4, 2004
Reply to Office Action of: May 4, 2004

MTS-3268US

such material would be obvious because such recovery would be economically beneficial.

As discussed above, Ueno does not disclose a process in which a resin material is brought into contact with mixture containing (1) a dehalogenation promoting material, and (2) a dehalogenation material under conditions recited in the claims. The Office has given no motivation why the person of ordinary skill in the art would be motivated to modify the process of Ueno to produce the process recited in applicants' claim 18 and 19 by including this treatment step. Therefore, the rejection of claims 18 and 19 as unpatentable over Ueno should be withdrawn.

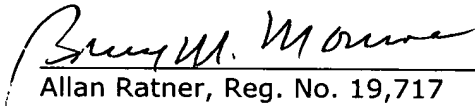
Claim 25

Contrary to the Office assertion, claim 25 does not recite a recovery step. Claim 25 depends on claim 6. It is submitted that claim 25 is patentable over Ueno for the same reasons claim 6 is patentable over Ueno, given above.

Conclusion

It is respectfully submitted that the claims are in condition for immediate allowance and a notice to this effect is earnestly solicited. The Examiner is invited to phone applicants' attorney if it is believed that a telephonic or personal interview would expedite prosecution of the application.

Respectfully submitted,



Allan Ratner, Reg. No. 19,717

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Attorneys for Applicants

BMM/fp/dmw

Dated: August 4, 2004

Enclosure: Great Lakes Chemical Corporation MSDS for BA-59P and BA-59PC

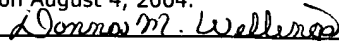
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The Commissioner for Patents is hereby authorized to charge payment to Deposit Account No. **18-0350** of any fees associated with this communication.

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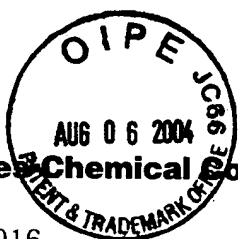


Donna M. Wellings

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Great Lakes Chemical Corporation



MATERIAL SAFETY DATA SHEET

MSDS Number: 00016

Effective Date: 10/30/2002

Product Name: Great Lakes BA-59P and BA-59PC

Page: 1 of 8

SECTION I - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Great Lakes BA-59P and BA-59PC
Manufacturer: Great Lakes Chemical Corporation
Address: P.O. Box 2200 **City:** West Lafayette
State: Indiana **Zip:** 47996-2200
Emergency Telephone Number: 1-800-949-5167
Information Telephone Number: 1-765-497-6100 **Fax:** 1-765-497-6123
Chemtrec Phone: 1-800-424-9300; Internationally call 703-527-3887
Effective Date: 10/30/2002 **Supercede Date:** 12/29/1999
MSDS Prepared By: Regulatory Affairs Department/Great Lakes Chemical Corporation
Synonyms: Tetrabromobisphenol A, TBBPA, 4,4'-Isopropylidene-bis(2,6-dibromophenol), Compacted BA-59P
Product Use: Flame Retardant
Chemical Name: 4,4'-(1-Methylethylidene)bis[2,6-dibromo-]phenol
Chemical Family: Halogenated bisphenol A

Additional Information

No information available

SECTION II - COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NO.	%	EXPOSURE LIMITS
Tetrabromobisphenol A	79947	>98.5	N (Hazardous) 15 mg/m3 (PNOR) (OSHA PEL TWA) Not established (OSHA PEL STEL) Not established (OSHA PEL CEIL) 10 mg/m3 (PNOC) (ACGIH TLV TWA) Not established (ACGIH TLV STEL) Not established (ACGIH TLV CEIL)
Tribromobisphenol A	6386738	<1.5	N (Hazardous) 15 mg/m3 (PNOR) (OSHA PEL TWA) Not established (OSHA PEL STEL) Not established (OSHA PEL CEIL) 10 mg/m3 (PNOC) (ACGIH TLV TWA) Not established (ACGIH TLV STEL) Not established (ACGIH TLV CEIL)

*Indented chemicals are components of previous ingredient.

Additional Information

5 mg/m3 Respirable Dust Level (OSHA)
3 mg/m3 Respirable Dust Level (ACGIH)
PNOR = Particulates Not Otherwise Regulated
PNOC = Particulates Not Otherwise Classified

SECTION III - HAZARDS IDENTIFICATION

Emergency Overview: White crystals or powder
Slight odor
Not expected to be a hazard in normal industrial use.
Toxic to aquatic organisms.

MATERIAL SAFETY DATA SHEET

MSDS Number: 00016

Effective Date: 10/30/2002

Product Name: Great Lakes BA-59P and BA-59PC

Page: 2 of 8

SECTION III - HAZARDS IDENTIFICATION

Relevant Routes of Exposure: Inhalation and ingestion.
Signs and Symptoms of Overexposure: No known signs and symptoms of exposure.
Medical Conditions Generally Aggravated By Exposure: None reported
Potential Health Effects: See Section XI for additional information.
Eyes: Not expected to be a hazard in normal industrial use.
Skin: As with any dust, mechanical irritation is possible to the eye.
Not expected to be a hazard in normal industrial use.
As with any dust, mechanical irritation is possible to the skin.
Ingestion: Not expected to be a hazard in normal industrial use.
Inhalation: As with any dust, mechanical irritation is possible to mucous membranes and the respiratory tract.
Chronic Health Effects: None known
Carcinogenicity:
NTP: No
IARC: No
OSHA: No
ACGIH: No
OTHER: No

Additional Information

No information available

SECTION IV - FIRST AID MEASURES

Eyes: Flush with large volumes of water for at least 15 minutes. Get medical attention.
Skin: Wash with large volumes of soap and water for at least 15 minutes. If irritation develops, get medical attention.
Ingestion: If conscious, give person 1 to 2 glasses of water. Get medical attention immediately.
Inhalation: Remove person to fresh air. Get medical attention.
Antidotes: No information available
Notes to Physicians and/or Protection for First-Aiders: No information available

Additional Information

No information available

SECTION V - FIRE FIGHTING MEASURES

Flammable Limits in Air (% by Volume): Not available
Flash Point: Not applicable
Autoignition Temperature: Not available
Extinguishing Media: All conventional media are suitable.
Fire Fighting Instructions: Wear a self-contained breathing apparatus and protective clothing to prevent skin and eye contact in fire situations.
Unusual Fire and Explosion Hazards: Under fire conditions, toxic and irritating fumes may be emitted.
Flammability Classification: Non-flammable solid
Known or Anticipated Hazardous Products of Combustion: Hydrogen bromide and/or bromine
Carbon monoxide and carbon dioxide

MATERIAL SAFETY DATA SHEET

MSDS Number: 00016

Effective Date: 10/30/2002

Product Name: Great Lakes BA-59P and BA-59PC

Page: 3 of 8

SECTION V - FIRE FIGHTING MEASURES

Additional Information

No information available

SECTION VI - ACCIDENTAL RELEASE MEASURES

Accidental Release Measures: Wearing appropriate personal protective equipment, carefully sweep up material and place in suitable labeled containers for disposal.

Personal Precautions: See Section VIII.

Environmental Precautions: No information available

Additional Information

No information available

SECTION VII - HANDLING AND STORAGE

Handling: Use appropriate personal protection equipment.
Avoid eye, skin and clothing contact.
Avoid breathing dust.
Avoid repeated and prolonged contact.
Avoid creating a dusting situation.

Storage: Store in a cool, dry, well-ventilated area away from incompatible materials.
Keep container tightly closed.

Other Precautions: No information available

Additional Information

No information available

SECTION VIII - EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: Adequate general ventilation is recommended when handling to control airborne levels.

Ventilation Requirements: Use local exhaust to minimize dusting.
Use mechanical ventilation for general area control.

Personal Protective Equipment:

Eye/Face Protection: Chemical safety glasses with side shields or chemical safety goggles

Skin Protection: Neoprene gloves
Clothing designed to minimize skin contact

Respiratory Protection: Wear a NIOSH/MSHA approved dust respirator if dusting occurs, or there is potential for airborne exposures to exceed established threshold values.
Consult the OSHA respiratory protection information located at 29CFR 1910.134 and the American National Standard Institute's Practices of Respiratory Protection Z88.2.

Other Protective Clothing or Equipment: No information available

Exposure Guidelines: See Section II.

Work Hygienic Practices: Wash thoroughly after handling.
Wash contaminated clothing before reuse.

Additional Information

No information available

MATERIAL SAFETY DATA SHEET

MSDS Number: 00016

Effective Date: 10/30/2002

Product Name: Great Lakes BA-59P and BA-59PC

Page: 4 of 8

SECTION IX - PHYSICAL & CHEMICAL PROPERTIES

Appearance:	White crystals or powder	Percent Volatile:	Not available
Boiling Point:	~601 degrees F	pH Value:	Not available.
Bulk Density:	0.96 (L); 1.36 (P)	pH Concentration:	Not available
Color:	White	Physical State:	Solid
Decomposition Temperature:	Not available	Reactivity in Water:	Not water reactive
Evaporation Rate:	Not available	Saturated Vapor Concentration:	Not available
Freezing Point:	Not available	Softening Point:	Not available
Heat Value:	Not available	Solubility in Water:	See below
Melting Point:	180-182 degrees C	Specific Gravity or Density (Water=1):	2.2
Molecular/Chemical Formula:	C15H12Br4O2	Vapor Density:	Not available
Molecular Weight:	543.7	Vapor Pressure:	<1.19 10E-5 PA @ 20 degrees C
Octanol/Water Partition Coefficient:	Log 5.903	Viscosity:	Not available
Odor:	Slight	Volatile Organic Compounds:	Not available
Odor Threshold:	Not available	Water/Oil Distribution Coefficient:	Not available
Particle Size:	52.20 um (mean)	Weight Per Gallon:	Not available

Additional Information

Minimum Ignition Energy >10J

Solubility in Water: 0.148 mg/L in pH 5.0; 1.26 mg/L in pH 7.0; 2.34 mg/L in pH 9.0

SECTION X - STABILITY AND REACTIVITY

Stability:	Stable under normal conditions of handling and use.
Conditions to Avoid:	None
Incompatibility With Other Materials:	Strong oxidizers
Hazardous Decomposition Products:	Thermal decomposition may produce the following: Hydrogen bromide and/or bromine Carbon monoxide and carbon dioxide
Hazardous Polymerization:	Will not occur
Conditions to Avoid:	None

Additional Information

No information available

SECTION XI - TOXICOLOGICAL INFORMATION

VALUE (LD50 OR LC50)	ANIMAL	ROUTES	COMPONENTS
>0.5 mg/L/8H	Rat, Mouse, Guinea Pig	Acute Inhalation	Tetrabromobisphenol A
>10,000 mg/kg	Mouse	Acute Oral	Tetrabromobisphenol A
>2,000 mg/kg	Rabbit	Acute Dermal	Tetrabromobisphenol A
>5,000 mg/kg	Rat	Acute Oral	Tetrabromobisphenol A

Toxicological Information:

This material was not found to be acutely toxic in skin, inhalation or ingestion exposure studies.

This material has been determined not to be a primary eye irritant in rabbits.

MATERIAL SAFETY DATA SHEET

MSDS Number: 00016

Effective Date: 10/30/2002

Product Name: Great Lakes BA-59P and BA-59PC

Page: 5 of 8

This material has been determined not to be a primary skin irritant in rabbits.
This material was not determined to be mutagenic in the Ames Test.
This material did not cause sensitization in a guinea pig maximization study.

In a fourteen day rat inhalation study, no adverse effects were seen for exposures up to 18 mg/L for exposures of four hours/day for five days/week.

In a twenty-one day dermal study in rabbits, no adverse effects were seen at levels up to 2,500 mg/kg/day for five days/week. Mild skin redness was observed in this study.

Twenty-eight day feeding studies in rats at doses to 1000 ppm in the diet showed no compound related toxicities with little or no increase in bromine levels of fat or liver tissues.

In a pilot teratology study, female rats were administered by gavage at dose levels of 30, 100, 300, 1,000, 3,000 and 10,000 ppm/kg/day. Three of five animals died in the 10,000 mg/kg/day group, while the remaining two animals revealed signs of toxicity. There were no differences in the mean number of viable or nonviable fetuses, absorptions, implantations, or corpora lutea when compared to the controls for animals receiving 3,000 mg/kg/day or less.

In a rat 90-day oral toxicity study, the No Observed Adverse Effect Level (NOAEL) was 1000 mg/kg/day, the highest dose tested. No effect on mortality, clinical signs, body or organ weights, histopathology, urinalysis, ophthalmology, FOB, MA, serum TSH, serum T3 or serum chemistries was observed. Differences were observed for bilirubin and ALP, but neither of these changes were found to be biologically or toxicologically meaningful or adverse. Serum T4 levels were decreased in treated animals, but the decrease was not of sufficient magnitude to induce adverse effects.

In an oral prenatal development toxicity study in rats dosed at 0, 300, and 1,000 mg/kg/day, no maternal related effects of treatment were seen from clinical examinations, and no effect of treatment was evident from gestational parameters (body weight, body weight gain, or food consumption), uterine implantation data, liver weights, or necropsy findings. Likewise, no effect of treatment was evident from fetal body weights, fetal sex distribution, or from fetal external, visceral, or skeletal examinations. Thus, the NOAEL for maternal and developmental toxicity was 1,000 mg/kg/day, the highest dose level evaluated.

Other acute and chronic health hazards, as well as target organs, are unknown.
As with all dusts, inhalation of air concentration levels above the PNOR may cause irritation and adverse lung effects.

Additional Information

SECTION XII - ECOLOGICAL INFORMATION

Ecological Information:

The following ecological information is offered:

48 Hour Static Daphnia magna: LC50 = 0.96 mg/L (NOEL <0.32 mg/L).

96 Hour Static Rainbow trout: LC50 = 0.40 mg/L.

96 Hour Static Bluegill sunfish: LC50 = 0.51 mg/L.

96 Hour Freshwater Algae: Cell density was not reduced at any test concentration (0.34 to 5.6 mg/L) relative to the controls.

96 Hour Chlorella: EC50 >1,500 ug/L.

72 Hour S. costatum: EC50 = 90 - 890 ug/L.

72 Hour T. pseudonana: EC50 = 130 - 1,000 ug/L.

96 Hour Flow-through Fathead minnow: LC50 = 0.54 mg/L (NOEL = 0.26 mg/L).

96 Hour Flow-through Eastern oysters EC50 = 98 ug/L.

MATERIAL SAFETY DATA SHEET

MSDS Number: 00016

Effective Date: 10/30/2002

Product Name: Great Lakes BA-59P and BA-59PC

Page: 6 of 8

SECTION XII - ECOLOGICAL INFORMATION

The toxicity of TBBPA to fathead minnow embryos and larvae was evaluated. The LOEC was 0.31 mg/L, based on significantly reduced embryo and larval survival of fathead minnows exposed to TBBPA. The NOEC was 0.16 mg/L TBBPA. Based on these results, the MATC for TBBPA and fathead minnows is estimated as >0.16 and <0.31 mg/L.

The flow-through chronic toxicity of TBBPA to *Daphnia magna* was evaluated. Based on the effect of TBBPA on daphnid reproduction, the MATC to *Daphnia magna* is estimated as >0.30 and <0.98 mg/L.

This material is toxic to aquatic organisms.

Only partially biodegradable in soil and water.

Half-life of TBBPA is about 0.12 day when irradiated with UV light at 254 nm.

In an activated sludge, respiration inhibition test, minimal inhibitory effects upon respiration were observed at a concentration of 15 mg/L. The average percent inhibition observed was approximately 1.9%.

Avoid releasing to the environment.

Additional Information

No information available

SECTION XIII - DISPOSAL CONSIDERATIONS

Disposal Considerations: Dispose of waste at an approved chemical disposal facility in compliance with all current Local, State/Province, Federal/Canadian laws and regulations.

Additional Information

No information available

SECTION XIV - TRANSPORT INFORMATION

U.S. DOT

Proper Shipping Name:	Not regulated	ID Number:	N/A
Hazard Class:	N/A	Labels:	N/A
Packing Group:	N/A	Packaging Exceptions:	N/A
Special Provisions:	N/A	Bulk Packaging:	N/A
Non-Bulk Packaging:	N/A	Air Cargo Limit:	N/A
Passenger Air/Rail Limit:	N/A	Other Stowage:	N/A
Vessel Stowage:	N/A		
Reportable Quantity:	N/A		

AIR - ICAO OR IATA

Proper Shipping Name:	Not regulated	ID Number:	N/A
Hazard Class:	N/A	Packing Group:	N/A
Subsidiary Risk:	N/A	Packing Instructions:	N/A
Hazard Labels:	N/A	Packing Instruction -	
Air Passenger Limit Per Package:	N/A	Cargo:	N/A
Air Cargo Limit Per Package:	N/A	Special Provisions	N/A
		Code:	

MATERIAL SAFETY DATA SHEET

MSDS Number: 00016

Effective Date: 10/30/2002

Product Name: Great Lakes BA-59P and BA-59PC

Page: 7 of 8

SECTION XIV - TRANSPORT INFORMATION

WATER - IMDG

Proper Shipping Name:	Not regulated	ID Number:	N/A
Hazard Class:	N/A	Subsidiary Risk:	N/A
Packing Group:	N/A		
Medical First Aid Guide Code:	N/A		

Additional Information

No information available

SECTION XV - REGULATORY INFORMATION

U.S. Federal Regulations:

The components of this product are either on the TSCA Inventory or exempt (i.e. impurities, a polymer complying with the exemption rule at 40 CFR 723.250) from the Inventory.

SARA 313

The following materials are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:

Tetrabromobisphenol A (De minimis concentration = 1%; Reporting threshold = 100 lb)

State Regulations:

None known

International Regulations:

This material (or each component) is listed on the following inventories:

EU - EINECS

Canada - DSL

Australia - AICS

Korea - ECL

Japan - ENCS

Philippines - PICCS

China - List I

Canadian WHMIS Hazard Class and Division = Not controlled

SARA Hazards:

Acute:	No	Chronic:	No
Reactive:	No	Fire:	No
Pressure:	No		

Additional Information

The above regulatory information represents only selected regulations and is not meant to be a complete list.

SECTION XVI - OTHER INFORMATION

NFPA Codes:

Health:	NR	Flammability:	NR
Reactivity:	NR	Other:	NR

HMIS Codes:

Health:	1	Flammability:	1
Reactivity:	0	Protection:	X

* indicates chronic health hazard.

Label Statements:

Not available

Other Information:

Abbreviations:

(L) = Loose bulk density in g/ml

LOEC = Lowest observed effect concentration

MATC = Maximum acceptable toxicant concentration

MATERIAL SAFETY DATA SHEET

MSDS Number: 00016

Effective Date: 10/30/2002

Product Name: Great Lakes BA-59P and BA-59PC

Page: 8 of 8

SECTION XVI - OTHER INFORMATION

NA = Not available
N/A = Not applicable
NL = Not limited
NOAEL = No observable adverse effect level
NOEC = No observed effect concentration
NOEL = No observable effect level
NR = Not rated
(P) = Packed bulk density in g/ml
PNOC = Particulates Not Otherwise Classified
PNOR = Particulates Not Otherwise Regulated
REL = Recommended exposure limit
TS = Trade secret

Additional Information

Information on this form is furnished solely for the purpose of compliance with OSHA's Hazard Communication Standard, 29CFR 1910.1200 and The Canadian Environmental Protection Act, Canada Gazette Part II, Vol. 122, No. 2 and shall not be used for any other purpose.

Revision Information:

General review and update

Section XI - Toxicological Information

Section XII - Ecological Information

Section XV - International Inventories